CLAIMS

1. An antibody Fab fragment characterized in that the heavy chain constant region terminates at the interchain cysteine of C_H1.
2. The antibody Fab fragment of claim 1 in which the interchain cysteine of C_H1 is covalently linked to the interchain cysteine of C_L.
3. The antibody Fab fraglment of claim 1 or claim 2 in which the interchain cysteine of C_H1 is at position 233 of the heavy chain.
4. The antibody Fab fragment of claim 1 or claim 2 in which the interchain cysteine of C_H1 is at position 127 of the heavy chain.
5. The antibody Fab fragment of claim 1 or claim 2 in which the interchain cysteine of C_H1 is at position 128 of the heavy chain.
6. The antibody Fab fragment of claim 1 or claim 2 in which the interchain cysteine of C_H1 is at position 235 of the heavy chain.
7. The antibody Fab fragment of claims 1-5 in which the interchain cysteine of the light chain constant region is at position 214 of the light chain.
8. The antibody Fab fragment of claims 1-3 in which the heavy chain constant region comprises or consists of a sequence having at least 90% identity or similarity to the sequence given in SEQ ID NO:1.
9. The antibody Fab fragment of claim 8 in which the light chain constant region comprises or consists of a sequence having at least 90% identity or similarity to the sequence given in SEQ ID NO:2.
10. The antibody Fab fragment of claims 1, 2 and 6 in which the heavy chain constant region comprises or consists of a sequence having at least 90% identity or similarity to the sequence given in SEQ ID NO:3.
11. The antibody Fab fragment of claim 10 in which the light chain constant region comprises or consists of a sequence having at least 90% identity or similarity to the sequence given in SEQ ID NO:4.
12. The antibody Fab fragment of claims 1 to 11 to which one or more effector molecules are attached.
13. The antibody Fab fragment of claim 12 to which two or more effector molecules are attached.

14. The antibody fragment of claim 13, wherein an effector molecule is attached to a cysteine in the light chain constant region and a cysteine in the heavy chain constant region.

15. The antibody fragment of claim 14, wherein the cysteine residues in the heavy and light chain constant regions which are attached to effector molecules would otherwise be linked to each other via a disulphide bond if the effector molecules were not attached.

16. The antibody fragment of claim 15 where the light chain cysteine to which an effector molecule is attached is the interchain cysteine of C_L and the heavy chain cysteine to which an effector molecule is attached is the interchain cysteine of C_H1.

17. The antibody Fab fragment of claims 12-16 wherein the effector molecule is PEG

18. A method of producing an antibody Fab fragment according to claims 12-17 comprising:

    a. Treating an antibody Fab fragment according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 with a reducing agent capable of generating a free thiol group in a cysteine of the heavy and light chain constant region
    b. Reacting the treated fragment with an effector molecule

19. The method according to claim 18 in which the reducing agent is a non-thiol based reductant.

20. The method according to claim 19 in which the reductant is a trialkylphosphine.

21. The method according to claim 20 where the non-thiol based reductant is tris(2-carboxyethyl)phosphine (TCEP).

22. The method according to claim 20 where the non-thiol based reductant is tris(3-hydroxypropyl)phosphine (THP).

23. The method according to claim 18 in which either or both of steps (a) and (b) are performed in the presence of a chelating agent.

24. The method according to claim 23 in which the chelating agent is EDTA.

25. The method according to claim 24 in which both steps (a) and (b) are performed in the presence of EDTA.

26. A mixture containing two or more antibody Fab fragments, characterized in that the mixture is enriched for Fab fragments in which the C_H1 domain terminates at the interchain cysteine, the heavy chains in the fragments are not covalently bonded to the light chains and the fragments have an effector molecule attached to a cysteine in the light chain and the heavy chain constant region.

27. The mixture of claim 26 in which greater than 50% of the mixture comprises a Fab fragment in which the C_H1 domain terminates at the interchain cysteine, the heavy chains in the fragments are not covalently bonded to the light chains and the fragments have an effector molecule attached to a cysteine in the light chain and the heavy chain constant region.

28. An isolated DNA sequence encoding the heavy and/or light chain constant regions of an antibody Fab fragment according to any one of claims 3-11.

29. A cloning or expression vector comprising one or more DNA sequences according to claim 28.

30. The vector according to claim 29, wherein the vector comprises the sequence given in SEQ ID NO:5.

31. The vector according to claim 30 further comprising the sequence given in SEQ ID NO:6.

32. The vector according to claim 29, wherein the vector comprises the sequence given in SEQ ID NO:7.

33. The vector according to claim 32 further comprising the sequence given in SEQ ID NO:8.

34. A host cell expressing the antibody Fab fragment of claim 1, 2, 3, 4, 5, 6,7, 8, 9,10 or 11

35. A host cell according to claim 34 comprising one or more cloning or expression vectors according to claims 29-33.

36. A process for producing the antibody Fab fragment of claim 1,2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 comprising culturing the host cell of claim 34 and isolating said fragment.

37. A pharmaceutical composition comprising an antibody Fab fragment according to claims 1-17 and 26-27, together with one or more pharmaceutically acceptable excipients, diluents or carriers.